

view of Ishikawa and Aikawa in further view of Unger (U.S. Patent No. 4,691,991) and Claims 13 and 14 stand rejected under 35 U.S.C. § 103 as being obvious over Campion in view of Ishikawa and Aikawa in further view of Bachman (U.S. Patent No. 4,468,413).

REJECTION UNDER 35 U.S.C. § 103

The Official Action has rejected Claims 1-4 and 6-11 under 35 U.S.C. § 103 as being obvious over Campion in view of Ishikawa and Aikawa. The Official Action states that Campion discloses all of the Applicants' claim limitations with the exception of refractive indices of the cladding and the jacket being equal and the doping of silica glass with 0.4% by weight fluorine. The Official Action cites Ishikawa and Aikawa as respectively teaching these more detailed aspects of the Applicants' invention and states it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of the cited references to arrive at the Applicants' claims. Applicants respectfully traverses the rejection.

Claim 1 recites, *inter alia*, a single mode optical fiber including:

“ . . . refractive indices of the core portion (4) is larger than those of the cladding portion and jacketing portion areas (3, 1) and in which the refractive indices of the cladding portion and jacketing portion areas (3, 1) are practically equal, characterised in that the internal cladding portion (3) is built up of SiO₂ comprising a fluorine doping within a range of 0.1 - 8.5 wt.%, thus resulting in the core portion (4) to be subjected to a compressive axial stress over its full cross section.”

Campion discloses an optical fiber preform based on silica and includes an optical core (20), a cladding (21) inside a tube (22), wherein the optical core, cladding and tube constitute the primary preform (24). The preform, according to Campion has a peripheral zone of silica doped with alumina, which zone, once drawn down in geometrically similar

manner, imparts high strength to the optical fiber manufactured from said preform.¹ Silica particles are deposited on the primary preform to form a portion (26) of a build-up zone (23), the composition of this portion 26 being almost identical to that of the tube, i.e., ultra-pure silica. The portion and the tube together form an inner zone (27) of outer sheath (28). Then, alumina particles mixed with the grains of silica are deposited in a peripheral zone (25) of the build-up zone, which peripheral zone comprises all of the last external layers to be deposited in the build-up zone. Feeding alumina particles into the peripheral zone of the build-up zone makes it possible to manufacture an optical fiber 15 industrially by hot fiber drawing, which optical fiber withstands hydrogen better than prior art optical fibers.² Thus, the object of Campion is to make it possible for an optical fiber that is almost impermeable to hydrogen and that has good strength to be manufactured industrially.³

Ishikawa discloses a method for fabricating a glass preform for optical fiber having a silica glass portion doped with low concentration fluorine having high uniformity in the growing direction. A period of growth of the deposit body of fine glass particles includes a period for increasing a flow rate of the fluorine compound gas supplied and a step of heating to transparentize the deposit body of fine glass particles.⁴ Thus, the method according to Ishikawa is effective for fabricating a glass preform for optical fiber having a uniform index profile independent of deposition. Figs. 14 to 17 show examples of index profile of glass preforms for optical fiber to which it is applicable; as can be appreciated, the index profile shown in Fig. 14 comprises three separate zones, i.e., a core, a cladding and an outer sheath.

¹ Campion, column 3, lines 16-21.

² Campion, column 5, lines 24-28.

³ Campion, column 2, lines 26-28.

⁴ Ishikawa, column 2, lines 16-34.

The refractive index of the outer sheet portion is higher than that of the cladding portion, but smaller than that of the core portion. Similarly, Figs. 15-17 demonstrate that the index profile, which includes the refractive indices of the cladding portion and jacketing portion areas, are not equal.

Aikawa discloses a dispersion compensating fiber that can compensate the chromatic dispersion of a 1.3 μm SMF, and at the same time, provide a small dispersion slope and a small transmission loss.⁵ The refractive index profile shown in Fig. 1 comprises a central core (21a), a middle part (21b) surrounding the central core and having a lower refractive index than the central core, and a cladding (22) surrounding this middle part (21) and having a higher refractive index than the middle part and a lower refractive index than the central core. The central core consists of silica, glass doped with germanium to increase the refractive index, the middle part (21b) consists of silica glass doped with fluorine to decrease the refractive index, and the cladding (22) consists of pure silica glass.⁶

Conversely, the present invention provides a method for manufacture of a single mode optical fiber, in which the hydrogen-induced attenuation at a wave length of 1550 nm is sufficiently low to ensure the total attenuation at that wavelength to be at most 0.25 dB/km, and preferably to be at most 0.2 dB/km.

As recited in Claim 1, the presence of axial compression in the core prevents the occurrence of the defects of the formation of groups like SiH and SiOH within the fiber. These compounds demonstrate a strong infra red absorption with attenuation peaks at wave lengths of about 1530 and 1385 nm.⁷ According to the present invention, the presence of

⁵ Aikawa, column 4, lines 29-33.

⁶ Aikawa, column 2, lines 37-52.

⁷ Specification, page 4, lines 1-10.

axial tension in the fiber core facilitates the formation of structural defects in the silicon dioxide core. The presence of axial compression in a fiber core will essentially inhibit the occurrence of such defects, thus leading to a substantially lowered hydrogen-induced attenuation.

In other words, the relationship of the refractive indices of the cladding portion and jacketing portion of Claim 1 are not disclosed or suggested by any of the cited references, either alone or in combination. Specifically, the refractive indices of the cladding portion and jacketing portioning areas of the claimed single mode optical fiber are practically equal, contrast this to Figs. 14-17 of Ishikawa which provides an index profile wherein the refractive index of the outer sheath is much higher than that of the cladding portion.

Moreover, in regards to the rejection of Claim 6, the cited references do not disclose this more detailed aspect of the Applicants' invention. The figures relating to a core of diameter 50 μm ,⁸ relate to the description of prior art reference British Patent No. GB B 2,145,240 and does not have any relationship with the dimensions of the optical fiber 15 as disclosed in Campion.

Further, aside from the fact that Ishikawa and Aikawa are directed to optical fiber, there is no motivation or suggestion for combining various features of these references for preventing the gradual introduction of hydrogen gas into an optical fiber from its surroundings.

When an obviousness determination is based on multiple prior art references, there must be a showing by the patent examiner of some "teaching, suggestion, or reason" to combine the references. Gambro Lundia AB v. Baxter Healthcare Corp., 110 F.3d 1573, 1579, 42 USPQ2d 1378, 1383 (Fed. Cir. 1997) (also noting that the "absence of such a

⁸ Campion, column 1, line 66 through column 2, line 3.

suggestion to combine is dispositive in an obviousness determination"). Whether motivation to combine the references is shown is a question of fact. See In re Dembiczak, 175 F.3d 994, 1000, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). Evidence of a suggestion, teaching, or motivation to combine prior art references may flow, *inter alia*, from the references themselves, the knowledge of one of ordinary skill in the art, or from the nature of the problem to be solved. See Dembiczak, 175 F.3d at 999, 50 USPQ2d at 1617. Although a reference need not expressly teach that the disclosure contained therein should be combined with another, see Motorola, Inc. v. Interdigital Tech. Corp., 121 F.3d 1461, 1472, 43 USPQ2d 1481, 1489 (Fed. Cir. 1997), the showing of combinability, in whatever form, must nevertheless be "clear and particular." Dembiczak, 175 F.3d at 999, 50 USPQ2d at 1617. "Trade-offs often concern what is feasible, not what is, on balance, desirable. Motivation to combine requires the latter." Winner International Royalty Corp. v. Wang, 53 USPQ2d 1580, 1587 (Fed. Cir. 2000). Interpreting the Supreme Court's decision in Dickinson v. Zurko, 50 USPQ2d 1930 (1999) regarding standard of review in patent matters, the CAFC determined that when upholding a rejection of a claimed invention in an appeal, the CAFC must find that the decision by the USPTO Board of Appeals and Interferences is supported by "substantial evidence," In re Gartside, 53 USPQ2d 1769 (Fed. Cir. 2000). Accordingly, for a rejection based on combination of references to be proper requires that the rejection be supported by substantial evidence that the motivation to combine references was not merely feasible, but desirable.

Independent Claim 8 recites substantially the same limitations as discussed above, and is therefore, likewise allowable. Similarly, dependent Claims 2-4, 6-7 and 9-11 are directly and/or indirectly dependent upon independent Claims 1 and 8, and are therefore, at least allowable by virtue of their dependency for the same reasons discussed above.

Accordingly, Applicants respectfully request that the rejection of Claims 1-4 and 6-11 under U.S.C. §103 be withdrawn.

Claims 5 and 12 stand rejected under 35 U.S.C. § 103 as being obvious over Campion in view of Ishikawa and Aikawa, and in further view of Unger. The Official Action states that Campion, Ishikawa and Aikawa are applied as above, but fail to teach the use of an external cladding layer surrounding the jacketing layer which is next to the internal cladding layer. The Official Action cites Unger as teaching this more detailed aspect of the Applicants' invention and states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references to arrive at the Applicants' claims. Applicants respectfully traverse the rejection.

Unger discloses an optical fiber having little dispersion over a wide spectral range by providing a W-fiber having a threshold layer of cladding surrounding the inner cladding, the threshold layer having a raised index of refraction. The optical fiber (10), as shown in Fig. 5, includes a core (12) which is surrounded successively by an inner cladding layer (14), a threshold cladding layer (16) and an outer cladding layer (18). Fig. 2 illustrates the relative values of the indices of refraction.

As discussed above, neither Campion, Ishikawa nor Aikawa, alone or in combination, disclose or suggest the optical fiber recited in Applicants' claims. Likewise, Unger does not provide the deficiency discussed above with reference to these claims. Accordingly, Applicants respectfully submit that Claims 5 and 12 are allowable, at least for the same reasons discussed above by virtue of their dependency.

The Official Action has rejected Claims 13 and 14 as being unpatentable over Campion, Ishikawa and Aikawa as applied above in further view of Bachman. The Official Action states that Campion, Ishikawa and Aikawa disclose all the Applicants' claim

limitations with the exception of PCVD. The Official Action cites Bachman as disclosing this more detailed aspect of the Applicants' invention and states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of the cited references in accordance with the teachings of Bachman to arrive at the limitations of the rejected claims. Applicants respectfully traverse the rejection.

As discussed above, neither Campion, Ishikawa or Aikawa, alone or in combination, disclose or suggest the Applicants' invention as recited in the pending claims. Likewise, Bachman does not satisfy the deficiencies discussed above, and therefore, Applicants respectfully submit that dependent Claims 13 and 14 are allowable at least for the same reasons discussed above.

Accordingly, Applicants respectfully requests that the rejection of Claims 13 and 14 under 35 U.S.C. § 103 be withdrawn.

CONCLUSION

As Applicants have not amended the claims in response to any rejection on the merits, a rejection of the claims based upon newly cited prior art in the next communication cannot properly be considered a Final Office Action.

Consequently, in view of the foregoing remarks, it is respectfully submitted that the present Application, includes Claims 1-14, is patentably distinguished over the prior art, is in condition for allowance, and such action is respectfully requested at an early date.

Finally, the attention of the U.S. Patent and Trademark Office is directed to the change of address of Applicants' representative, effective January 6, 2003:

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Please direct all future communications to this new address.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read 'G. J. Maier'.

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